

THE THAUMALEIDAE(DIPTERA) OF THE
APPALACHIAN MOUNTAINS

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A family of Diptera Nematocera, the Thaumaleidae, comprises only a small number of species, scattered all over the world. We know at present four genera and 54 species of Thaumaleidae:

	<i>Austrothaumalea</i> Tonnoir	<i>Trichothaumalea</i> Edwards	<i>Thaumalea</i> Ruthé	<i>Androprosopa</i> Mik
Oceania	2			
America	5	1	4	
Asia			3	
Africa			3	
Europe			35	1

Nearly all the species of Thaumaleidae have a small distribution area and no one of them seems to be shared by two continents.

The Thaumaleidae are clearly distinct from all other Nematocera. All having the same appearance, they form a very homogeneous family. Slight structural differences of the wings and of the palpi enable us to separate the four genera of Thaumaleidae. Within each genus, species can be distinguished from one another only by the characters of the last abdominal segment and of the genital armature; this is true for both sexes.

In North America, only five species have been described at present; they are:

- Trichothaumalea pluvialis* (Dyar and Shannon 1924),
- Thaumalea americana* Bezzi 1913,
- Thaumalea elnora* Dyar and Shannon 1924,
- Thaumalea johannis* Dyar and Shannon 1924,
- Thaumalea fusca* Garret 1925.

The first of these five species differs from the others by the covering of the wings; there are macrotrichia not only on the veins, but also on the membrane of the wings. In all species of *Thaumalea*, there are macrotrichia only on the veins. The taxonomic characters of the four North American species of *Thau-*

malea are the length and ornamentation of the dististyles and the form of the parameres in the male.

Larvae of at least ten species of *Thaumalea*, from North America, Europe and North-Africa, were identified. All were collected in the same kind of habitat. They live exclusively on dripping rocks and are to be found only in places where the substrate is covered with a film of water. The ensemble of the animals that live in similar conditions has been defined by A. Thienemann in 1909 as the "Fauna hygropetrica." The body of a *Thaumalea* larva is not entirely covered with water and it usually touches the substrate only at its two extremities; that is why a *Thaumalea* larva, when disturbed, is able to glide swiftly on the water film, as well as a *Dixa* larva.¹ On a clear day, *Thaumalea* larvae, when undisturbed, move slowly, from time to time, seeking a shady place. In fact, they are cold water stenothermes and are not found, at low altitude, in hygropetric biotopes entirely exposed to sunshine. *Thaumalea* larvae belong to the trophic group of the "substrate eaters"; their mouth parts collect mud and particles of organic matter in the crevices of the rock. Only when they are ready to pupate do *Thaumalea* larvae leave the hygropetric habitat; then they hide in wet moss or bury themselves in mud. After emergence, the flies, rather clumsy and unable to travel far, stay in the daytime on bushes at a short distance from dripping rocks.

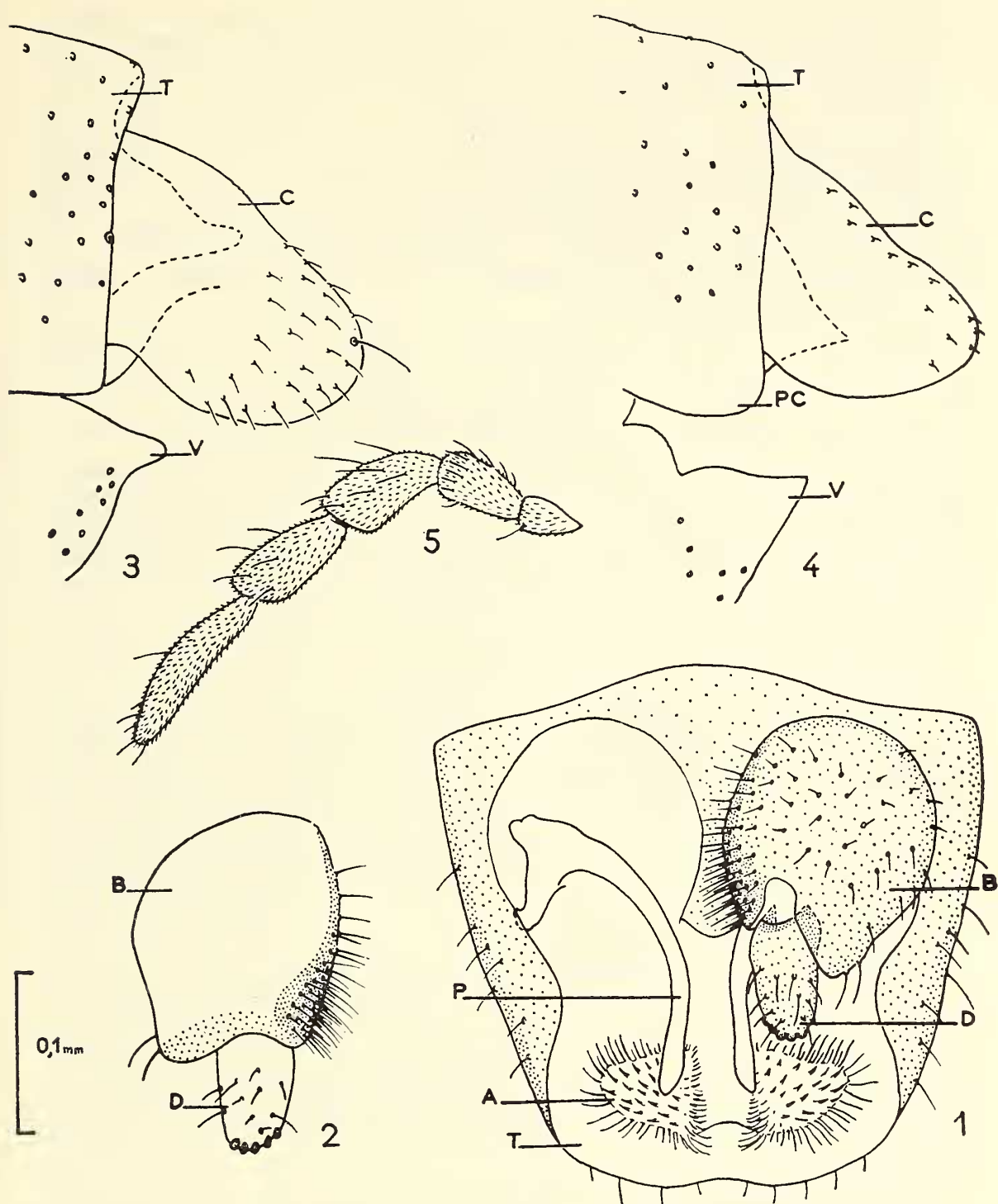
During the month of August, 1955, visiting the Great Smoky Mountains, I observed, in different hygropetric biotopes, numerous larvae of Thaumaleidae. I collected some of them and kept them alive. Finally I obtained males and females of two species of *Thaumalea*. One of the species is probably *T. americana* Bezzi; the other one is new.

Thaumalea americana Bezzi

Figures 1-3

Thaumalea americana was described by M. Bezzi in 1913, but the Italian entomologist did not give any figure of the fly and his description of the male genital parts of *T. americana* would fit just as well for specimens of many other species of *Thaumalea*. The type, collected by Dr. Johannsen in Ithaca, remained in M. Bezzi's collection.

¹ The way of progression of *Thaumalea* larvae has been thoroughly explained by A. Thienemann.



Figures 1-3: *Thaumalea americana* Bezzi. 1-2: male. 1: ninth tergite and genital parts, on ventral side; the right forceps is supposed to have been cut off. 2: left forceps, on dorsal side. 3: female, posterior extremity of the abdomen, side view.

Figures 4-5: *Thaumalea thornburghi*, new species. 4: female, posterior extremity of the abdomen, side view. 5: male, left maxillary palpus.

A: anal flap. B: basistyle or side piece. C: cercus. D: dististyle or clasper. P: paramere. PC: posterior corner of the ninth tergite. T: ninth tergite. V: valve.

All the figures on the same scale.

In 1924, H. J. Dyar and R. C. Shannon captured, in Pennsylvania and in Virginia, specimens of *Thaumalea*, which they considered to belong to the same species *T. americana*; they described the male, but did not figure it. One of the most important taxonomic characters they mentioned is the number of terminal spines on each dististyle; this number is only two. The American species of *Thaumalea* nearest allied to *T. americana* is *T. johannis*; the male of the latter species has about six apical spines on each dististyle.

Five years later, F. W. Edwards collected in Ithaca numerous males and females of *Thaumalea*; he believed they could be considered as specimens of *T. americana*, though he was able to compare them neither with the type, nor with Dyar and Shannon's samples of *T. americana*. Edwards's male specimens had about six small terminal spines on each dististyle and the English entomologist believed some of the spines of the dististyles had been overlooked on Dyar and Shannon's samples.

Edwards was able to compare, with the male type of *T. johannis*, the male samples of *T. americana* he collected. As the forceps are quite similar in both species, the characters Edwards used to distinguish *T. americana* and *T. johannis* are the color of the halteres—yellowish in the first species, dark in the second—and the shape of the parameres; these have parallel sides and are rounded at their tip in *T. americana*; they are spatulate at their tip in *T. johannis*.

Edwards's short description of *T. americana* and his figures of the genital parts of the male and of the female fit quite perfectly with the specimens I collected at Clingmans Dome, in the Smoky Mountains. I believe nevertheless it is better to give a precise description of these flies, and especially of their genital parts.

MALE: Thorax dark brown. Abdomen of a deeper shade. Antennae 12 segmented. Proportions of segments of an antenna are 15-37-28-9-9-9-13-15-11-13-19-24. The flagellar segments 1, 2, 4 and 8 bear on their dorsal side a long and stout seta. There are also two long setae at the tip of the last segment of the antenna. Wings of a uniform light brown tinge, quite similar to those of *T. thornburghi*, (Figure 8), though larger. Transverse nerve R_2 very faint; macrotrichia only on veins C, R and R_1 ; 25 macrotrichia on the vein R_1 . Halteres ochraceous. Ninth tergite without any projection of its edge. Basistyle of each forceps slightly longer than wide. Dististyle with hairs on its dorsal side as well as on its ventral side; at its tip, 5 dorsal directed teeth in a single row. Parameres only slightly broader at their distal end.

Measurements: length of the body: 2.8 mm. Antenna length: 0.28 mm. Wing length: 2.7 mm. Wing width: 1.1 mm.

FEMALE: The ninth tergite is devoid of lateral processes. Its posterior corners are at right angle.

Habitat: I obtained a male and a female specimen from larvae collected on August 26, 1955 at Cingmans Dome. The biotope was a dripping cliff on the roadside, at a short distance from the parking area, and at an elevation of about 6200 feet. Larvae of *Thaumalea americana* collected in Ithaca, New York, were described by O. A. Johannsen.

***Thaumalea thornburghi*, new species**

Figures 4-12

MALE: Thorax dark brown. Abdomen of a deeper shade. The number of segments of the antennae is most variable, which is unusual in Diptera; antennae of the holotype specimen are both 10 segmented, but a second specimen has antennae different from one another, though of the same length; one antenna is 10 segmented, while the other is only 7 segmented. In this abnormal antenna, some flagellar segments are fused. One antenna of a third specimen of *T. thornburghi* has 9 segments. Wings are of a uniform light brown tinge and have macrotrichia only on the veins C, R and R₁. There are only 10-12 macrotrichia on the vein R₁. The ventral edge of the ninth tergite projects backwards on each side. The basistyles are slightly wider than long. On their dorsal side, the dististyles have only three hairs and they bear, at their distal end, usually three brown blunt teeth in a single row; sometimes, the three teeth are not in a row or there are only two of them. At the tip of each dististyle is an ochraceous tooth truncate at its apex. On each dististyle, between the more distal of the brown teeth and the truncate one, there is a long seta. The parameres have a sharp tip. A posterior lobe of each anal flap projects between the parameres.

Measurements: length of the body: 2.0-2.1 mm. Antenna length: 0.28 mm. Wing length: 1.9-2.0 mm. Wing width: 0.75-0.8 mm.

FEMALE: In the two specimens examined, antennae are 9-segmented. The ninth tergite is rounded on both its posterior corners and is devoid of lateral processes. The valves of the genital plate are short.

Habitat: the male holotype was obtained from a larva collected on August 20, 1955, on Dripping Rock Cliff, beside Roaring Fork Creek, at about 2000 feet, with the same data for the female allotype, two male paratypes and a female paratype.

It is with pleasure that I name this species in honor of my friend, the writer Miss Laura Thornburgh, who kindly enabled me to pay a long visit to the Smoky Mountains and helped me in every possible way.

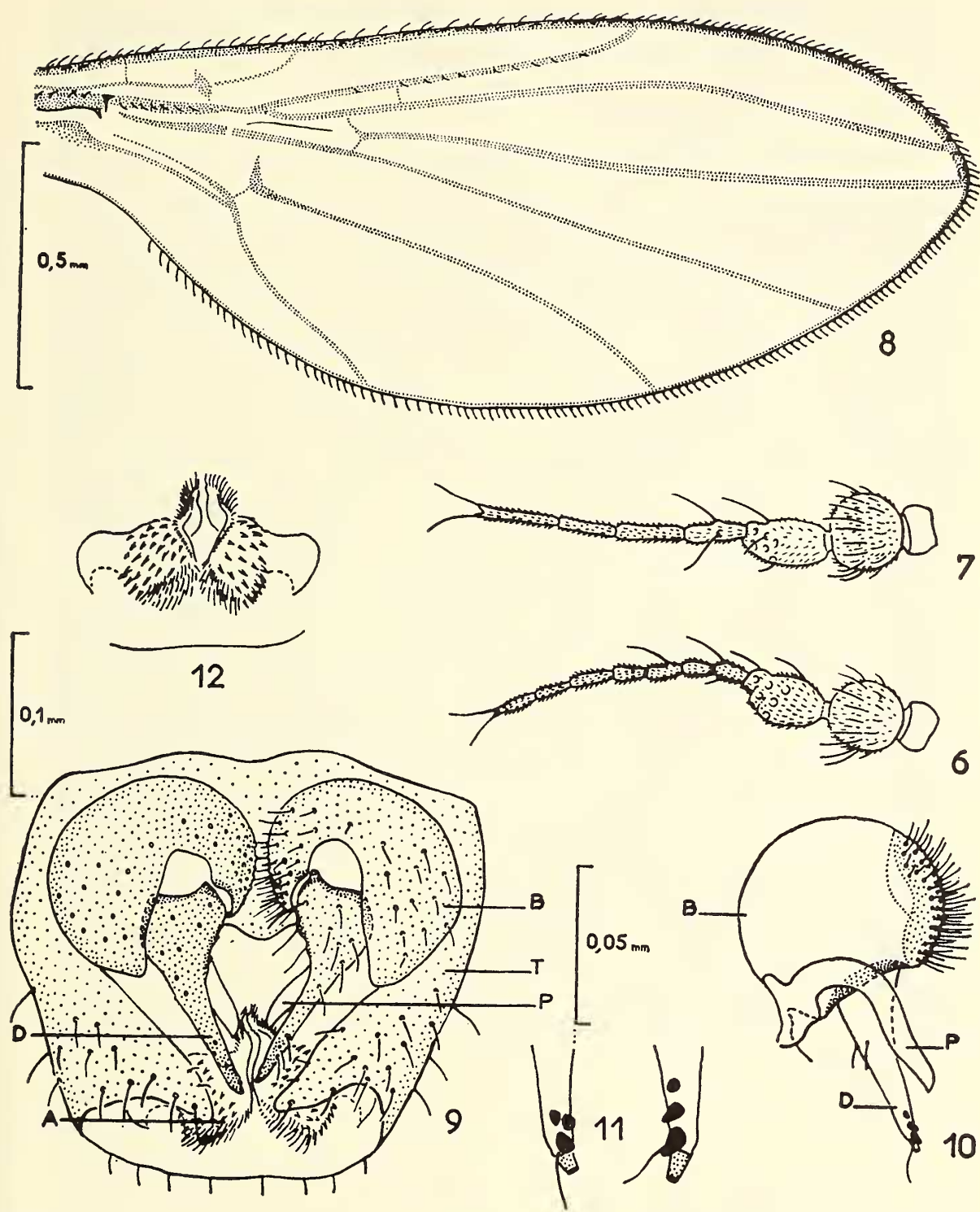
In 1913, the Italian entomologist, M. Bezzi, divided the dif-

ferent species of the genus *Thaumalea* into three distinct groups. The divisions were based solely upon differences of the male genitalia.

The male *Thaumalea* of Bezzi's first and second groups have forceps too long to be hidden dorsally by the ninth tergite, but the male flies of Bezzi's third group, or group C, have short forceps hidden dorsally by the ninth tergite. All North American species of *Thaumalea*, with the exception of *T. fusca*, belong to the group C. Both species of *Thaumalea* from Japan, *T. japonica* Okada and *T. striata* Okada, are in the same group C. So are two species from Europe, *T. nigra* Loew and *T. tarda* Loew, and one from Africa, *T. algira* Vaillant. But all the *Thaumalea* of the group C from Europe, Africa and Japan differ from the North American species of *Thaumalea* in their dististyles entirely devoid of teeth and of spines.

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Figures 6-12: *Thaumalea thornburghi*, new species, male. 6: left antenna of the holotype. 7: left antenna of a paratype. 8: wing. 9: ninth tergite and genital parts, on ventral side; the hairs of the right forceps have not been figured. 10: left forceps and left paramere, on dorsal side. 11: distal parts of both dististyles, dorsal view. 12: anal flaps, on dorsal side.

A: anal flap. B: basistyle or side piece. D: dististyle or clasper. P: paramere. T: ninth tergite.

The figures 6, 7, 9, 10 and 12 on the same scale.